Analysis of the Determinants of Education Expenditures in Malaysia

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Abstract — Expenditure on education helps in improving the skill formation and raises the ability of individuals to produce and work. It is said to be an investment in human capital which is closely connected with the economic development. Government education spending is of great importance to national development and plays a prime role in assisting growth and knowledge deepening. The aim of this study is to build on the established theories of public policy analysis on education and to empirically investigate and analyze the determinants of public expenditure on education in Malaysia. For the occasion of this study, it is posited that education expenditure is determined by multidimensional determinants. A number of theories are therefore incorporated regarding economic-demographics and political concept which have been used in the study. The results reveal that the education policy in Malaysia is mainly determined by budget deficit and the revenue collected by the government with a significant coefficient variables of -0.22and 0.15 percent respectively. Besides, unemployment has an inverse but insignificant impact on total educational expenditures. These results imply that the Malaysian government mainly takes into account only certain factors and neglect to incorporate the importance of other factors, such as demographic and educational indicators, when allocating education expenditures. Whereas Malaysian government education expenditure doesn't focus on the political factor which is well described by the insignificant level of 0.80 percent of the dummy election cycle variable.

Keywords – ***Determinants, education, expenditure, government education spending, Malaysia.***

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I. Introduction

Federation of Malaysia has focused considerable effort on developing and improving its national education system since gaining independence in 1957. In fact, the Malaysian education system can be regarded as an example of a model developed to support nation-building and economic growth. Investment in education and training is imperative to propel any economy to higher level of productivity and accelerate the rate of economic growth (Okeke 2014). Education is an important service sector which have been given focus in most of the developed countries. There has been lot of investment on education by the Malaysian government through the education ministries, however, it appears that the innovation, productivity and technology advancement are not improving as expected in order to produce a better educated labour force to increase the Malaysian economic growth. A number of previous studies was focused on public expenditure and the impact to economic growth have been conducted. The relationship between public expenditure and economic growth has attracted considerable interest on the part of economic researchers both in theoretical and empirical level.

Moreover, in most of the developing countries of the world, public education expenditure has been recognized as a salient aspect of fiscal outlays. This is mainly because education and human capital have been

found to have a positive and significant effect on economic growth (Rabiul 2016). Education improves health, reduces fertility rates, and enhances social and political participation. There is increasing empirical evidence that education matters, not only for the personal development, health status, social inclusion and labour market prospects of individual learners, but also for the broader economic performance of countries (OECD/UIS 2003).

The determinants of public education expenditure are crucial for the policy makers and policy analysts as they provide important information to achieve worthwhile outcomes. Although the Ministry of Education in Malaysia has well documented the relevance of government expenditure to education access and equity, there have been concern about determinants of the government education spending.

This research places the questions regarding the determinants of public education expenditures in Malaysia with the proper theoretical perspective, which is believed will generate profound findings. These findings will allow us to understand how government operates the formation of public policy spending at the national level. Education in Malaysia is an ongoing effort to improve student academic achievement based on the concept of balance in terms of physical, emotional, spiritual, and intellectual. Malaysian public spending on education as a percentage of GDP from 1971 to 2013 were provided by UNESCO. The average value for Malaysia during that period was 5.65 percent with a minimum of 3.96 percent in 2008 and a maximum of 7.66 percent in 2002. This is due to the crisis in 2008 and new education plans in 2002. Whereas public spending on education as a percentage of government spending for Malaysia from 1997 to 2015 has an average of 20.26 percent with a minimum of 14.04 percent in 2008 and a maximum of 25.9 percent in 2002. Public education spending increased from RM 6,596 million in 1990 to RM 56,817 million in 2015. This shows that education expenditures in Malaysia have been increasing substantially in the past few decades. This trend in education expenditure allocation has made it significant and it deserves a thorough analysis.

In October 2011, the Ministry of Education launched a comprehensive review of the education system in Malaysia in order to develop a new National Education Blueprint. The decision was made in the context of raising international education standards, the Government's aspiration of better preparing Malaysia's children for the needs of the 21st century, and increased public and parental expectations of education policy. The result is a Malaysia Education Blueprint that evaluates the performance of current Malaysia's education system with considerations of historical starting points against international benchmarks.

Therefore there is a strong need for further knowledge on this particular issue to provide analysis for policy makers. Of interest is the vast gap in the knowledge of the determinants of Malaysian education expenditures, which has had the largest share of Malaysia budget in recent years. It would be interesting, therefore, to find out what determines the allocation of education expenditures over time and across provinces in Malaysia. Such an analysis is indispensable as it would be quite helpful in the debate on whether there should be policies that try to benefit as many as possible or to determine which type of expenditure would benefit the country most.

II. Literature Review

Thomas R. Dye (1978) identifies a type of analysis of the determinants of public policy as "policy determinant" analysis and the consequences of public policy as "policy impact" analysis. The latter tends to pay attention to the consequences of public policy as a dependent variable and public policies as the independent variable. His research concluded that it is necessary for governments to pay careful attention to whether public policies produce desirable outcomes and what determines such policies.

There are many public policy determinant theories which are reviewed in order to provide a best framework for the public policy analyst. Nevertheless, much of the previous literature just explores the determinants of the government policy and the major economic variables such as economic growth and human capital impact issues. In this literature review, this paper seeks to critically asses the multi-layered dimension of the factors that also theoretically affect the allocation of public government expenditure on education. Firstly, we discuss about the early stage papers which focused on the overall public expenditure and its effect to the economy. Secondly, we discuss on the papers which focused on the education expenditure and what are the main variables that were used by the authors. This will be a good lead for selecting the variables that should be analyzed in our paper.

According to the Keynesian Counter-Cyclical theory, the decision to increase or decrease public expenditure, which may include educational expenditure, is determined by the economic conditions of a society. In other words, it can be explained that any changes in economic conditions may lead to changes in the allocation of public expenditure. Economic condition of a country determine the decision of the policy which also covers the explanation of the changes in allocation of education expenditures indirectly.

In the early stages, research on public expenditure were mostly focused on both the overall social expenditure pattern and the also the specific purpose of expenditure patter such as healthcare, housing, defense, public utilities, trade, transport communication and education expenditure. The key pieces of work on public expenditure analysis was done by Wagner (1958), Peacock and Wiseman (1967), and Musgrave (1969) in the early stages.

Adolf Wagner (1958) illustrated the model of public expenditure growth in an attempt to generalize and explain the changes in levels of public expenditure. Wagner explains three main reasons for increased government involvement. Wagner pointed out that industrialization and modernization, growth in real income and population growth gives a very significant effect to the public expenditure which also include education expenditure. Wagner views that economic development is accompanied by higher public expenditure, is not the only view that discusses the relationship of both variables.

According to Peacock and Wiseman, the ratio of government expenditures to GDP follows an upward sloping trend in normal times. In times of crisis, formerly unaccepted revenue-raising methods will be tolerated, and a higher tax tolerance will persist even after the crisis subsides. In other words, this trend is shifted permanently upward following a social upheaval. Educational expenditure should also be tested as to whether it is affected by a time of economic crisis.

Musgrave and Rostow put forward a development model that shows the causes for growth in public expenditure. They statement is that public expenditure is a prerequisite of economic growth. It is known that the public sector initially provides all type of public needs such as roads, railways, water supply and sanitation. As economic growth takes place, the balance of public investment shift towards human capital development through increased spending on education, health and welfare services (Edame 2014). They assumed that the nation grows like an organism making decision on behalf of the citizens, while society demand for infrastructure facilities such as education, health, electricity, transport etc, and grows faster than per capita income (Edame 2014).

The above papers focused on the social government expenditure. Whereas studies on the determinants of public education expenditure was carried out by Ram, 1995; Fernandez and Rogenson, 1997 using U.S. data during 1950-1990 and a cross country analyses was done by Hanushek and Rivkin, 1997. This study emphasises the economic determinants and neglects other factors. The analysis of education policy can go beyond economic determinants, as seen in many studies, such as political and social determinants. To be more comprehensive on the knowledge of policy analysis which is based on education, one should consider further the multidimensional determinants of policy. That is, a sound analysis should be done taking into consideration progress of social, political, and other important determinants, as well as provide further understanding of how public policy is made.

Macroeconomics and politics are always interconnected across the globe. The result of economic conditions have given a great impact on the election and voters selections. The model of the Political Business Cycle has been discussed by many scholars, such as Alesina and Sachs (1988) and Hibbs (1994). The model assumes that politicians are profit-maximizers, acting in their own self-interest. As the prime objective of politicians is to win an election, the politicians, especially those in a government party, will try to increase expenditure programs during the period before the election in order to satisfy the voters and to win the election. Education expenditure is also of the expenditure that can perhaps directly impact voters' decisions. The model assumes that the closer the time period of an election, the higher the expansion of public expenditure.

In addition, Buchana (1975) stated that governments have to increase taxes to meet the higher demand for public expenditure, such as educational expenditure. Therefore, revenue become an important factor in making decision of budgets in the economy. Theoretically, both indirect tax and tax burdens are considered as a fiscal illusion and this can be a useful indicator for the government increasing public expenditure and in turn gaining popularity from the constituents. Thus, government revenue plays a major role in determinant of public expenditure which includes the education expenditure of a country.

The analysis of public education expenditure requires a multi-layered approach. It is difficult, therefore, to isolate the concerns of economics, politics, and the social implications of public expenditure decisions (Danuvas 2012). The study results of this paper reveal that the education policy in Thailand is mainly determined by last year's expenditure. Thai government mainly takes into account certain factors and neglects to incorporate the other factors, such as demographic and educational indicators, when allocating education expenditures.

Therefore, based on the literature review and the analysis of variables used, the model of this paper was outlined. The Malaysian education system and its effect was also considered and all the variables been adjusted to the situation in Malaysia regarding to the economic theories.

III. Methodology

Augmented Dickey Fuller (ADF) unit root test and Ordinary Least Square (OLS) technique are employed to estimate the model of the study. The choice of OLS is used because it minimizes the error sum of squares and has a number of advantages such as unbiasedness, consistency, minimum variance and efficiency. Other than that, ADF test is applied to ensure that the time series data used in the analysis have constant mean and variance. The motivation is to hedge against spurious regression that may result from applying OLS to non-stationary time series data. Also, the ADF test addresses a shortcoming of the Dickey Fuller test – its lack of consideration of autocorrelation in the error term by adding lagged difference terms, thereby correcting for serial correlation. Furthermore, the models, before estimation, are subjected to multicollinearity test. After estimation, the models are subjected to tests of heteroskedasticity and autocorrelation described in the next section. Both tests are crucial so as to prevent either serial correlation or heteroskedasticity from biasing the standard errors on which inferential decisions are based.

IV. Data

The data for this study were collected from the Ministry of Education's statistical reports, annual report of Ministry of Finance, annual report of Economic Planning Unit from 1989 to 2016. So the data collected was for 26 years that is from 1990 to 2015. This data is used as this will show us the perfect result for the recent year of analysis which is important for the future improvisation. As the data for 2016 was estimated is was not used in the paper. Indicators that is used in the model are total government expenditure, GDP per capita, revenue, poverty rate, unemployment rate, population below 15, student/teacher ratio for primary level, student/teacher ratio for secondary level, student/teacher ratio per territory level, budget deficits and also election cycle.

This study uses many different categories of variables which include economy, politics and social demography. A multi-dimensional analysis of policy determinants framework for quantitative educational expenditure analysis was used. The proses of examining the determinants of education expenditure annual data on government expenditure from Ministry of Education is utilized. For each of the educational expenditures, all of the variables are incorporated into the estimation. All the economic variables that has been used should have a direct and significant impacts on the total education expenditure. Secondly, a higher rate of employment may force people to obtain more education and also put pressures on the government to increase public education expenditure in order to brace the economy growth. Furthermore, demographic variables are incorporated in the equation. Other dimensions of variable included is political variable that is election cycle year. This variable is to test whether the total government spending on education varies according to the political situation in the country.

V. Model Specification

After all of the critical explanations and discussion above, the total educational expenditure determination in Malaysia can be illustrated as the following functional Equation 1:

$$Tedu = f\left(Rev, Def, gdp, Pov, unemp, Pop < 15, \frac{s}{t}pri, \frac{s}{t}sec, \frac{s}{t}ter, EC\right) \quad (1)$$

Where,
Tedu is total education expenditure (RM Million), *Rev* is total revenue (RM Million), *Def* is budget deficit (RM Million), *Gdp* is GDP per capita (RM Million), *Pov* is Poverty rate (%), *Unemp* is unemployment rate (%), *Pop<15* is population less than 15 age group ('000), *s/t pri* student teacher ratio in primary schools, *s/t sec* is student teacher ratio in secondary schools, *s/t ter* is student teacher ratio in tertiary education, and *EC* is election cycle as dummy variable.

VI. Empirical Result and Discussion

The empirical results are presented for all equation using the time-series data at the national level for 26 years from 1990 to 2015. This includes the economic crisis period under the condition and for a better macro point of view. The results obtained can serve as an explanation of what actually determined the allocation of educational expenditure in Malaysia during the past 25 fiscal years. These empirical results are accompanied by the clear interpretation, as well as a discussion, of the probable underlying reasons for the estimated results, especially when the results are not consistent with expectation that we mentioned above. We begin empirical result with the result of the stationarity tests that is unit root test. This is since the data empirical that we use for our analysis is based on the time series data which would be summary biased if the underlying data are non-stationary. As noted earlier, the test used for observing the stationarity of the time series data used for analysis in this study is the Augmented Dickey- Fuller (ADF) test. The results are summarized in Table 1 below.

Before conducting the ADF tests summarized in the Table below, we carried out tests for determining the number of lags to be included in the ADF test. The selection order criteria used for these tests are the Akaike Information Criteria (AIC) and the Schwarz-Bayesian Information Criteria (SBIC). The appropriate lags suggested by these tests are reported for each variable in the fifth column that is order of integration of Table 1. The importance of choosing an optimal lag for the ADF test is to prevent the test result from being biased by correlation of the residuals.

Table 1:Summary of Unit root test, ADF and PP

Variables	**Test Equation**	**ADF**		**Order of Integration**
		Level	1st Difference	
Tedu	Intercept	-0.360977	-3.071758**	I(1)
Rev	Intercept	1.028473	-3.716656***	I(1)
Def	Intercept	-0.625979	-3.804061 ***	I(1)
Gdp	Intercept	1.410502	-6.218440***	I(1)
Pov	Intercept	-1.773382**	-3.832212***	I(0)
Unemp	Intercept	-4.438384***	-3.702563***	I(0)
Pop<15	Intercept	-3.845429***	-0.993791	I(0)
s/t pri	Intercept	1.447327	-3.695610**	I(1)
s/t sec	Intercept	0.661006	-3.397269***	I(1)
s/t ter	Intercept	-1.609017	-5.227865***	I(1)

* Significant at 10% level ** Significant at 5% level *** Significant at 1% level

As seen in the Table 1, poverty rate, unemployment rate and population below 15 are stationary at level. Therefore, for the subsequent analysis, these variables would not be differenced. All the other variables in the model are not stationary at level. However, after first differencing these variables become stationary. According to following results, all the variables would be applied in the model at their stationary orders, therefore first differenced stationary variables would be introduced into the model after first differencing, while level stationary variables would be introduced into the model without differencing. This will help the data to be stationary and hence we can run the OLS regression. Now it is full filled that OLS regression criteria that the data variables we use are stationary. The new equation for the model would be like the Equation 2 below:

$$DTedu = \beta o + \beta 1\, DRev + \beta 2\, DDef + \beta 3\, DGdp + \beta 4\, Pov + \beta 5\, unemp + \beta 6\, PoP < 15 + \beta 7\, D\frac{s}{t} pri + \beta 8\, D\frac{s}{t} sec + \beta 9\, D\frac{s}{t}\, ter + \beta 10\, EC \quad (2)$$

The model of this paper is estimated with OLS method. Therefore, before we tested for multicollinearity, OLS estimates tend to be biased. This study relied on pairwise correlation analysis of the respective variables in the model to judge the presence or otherwise of multicollinearity in the models. The summary of the multicollinearity tests is presented in Table 2. It is clearly seen from the Table 2 below, that none of the correlation coefficients are beyond 0.54. Usually, concerns of multicollinearity arise when the correlation amongst regressors are up to around 0.7. Hence we do not notice such high correlation in our model. Thus, we can proceed to fit the specified models using OLS.

Moreover, Table 3 below shows the summary of the result after running the OLS model using Eviews software. As it can be seen from the Table 3, the model of our study has coefficient of determination with value 0.735. This indicates that the fitted model explains about 73.5 percent of the determinants of public policy in Malaysia. This value is quite high that shows our model is good to proceed. The reason is because when the purpose of modeling is to determine causal effect, the size of the R2 tends not to matter so much. We would have been concerned with the value of the R2 had it been that the purpose of this model fitting is for forecast or prediction.

Table 2: Multicollinearity test.

	DTedu	**DREV**	**DDEF**	**DGDP**	**DS/Tter**	**DS/TPri**	**DS/TSec**	**UNEMP**	**POV**	**POP<15**
DTedu	1.0000									
DREV	0.3662	1.0000								
DDEF	-0.5501	0.1632	1.0000							
DGDP	-0.0557	0.4489	0.1805	1.0000						
DS/Tter	0.2322	0.0704	-0.1202	0.0800	1.0000					
DS/TPri	-0.2472	-0.1073	0.3024	0.0272	-0.0688	1.0000				
DS/TSec	-0.6264	-0.1033	0.4539	0.0602	-0.1200	0.3706	1.0000			
UNEMP	0.1379	-0.0219	-0.2916	-0.1818	-0.0779	-0.2202	-0.5428	1.0000		
POV	-0.1668	-0.2986	0.0204	-0.2503	0.0721	0.3846	0.1309	0.2934	1.0000	
POP<15	0.2747	0.2200	-0.2644	0.1517	0.0412	-0.4089	-0.1830	-0.0602	-0.4503	1.0000
EC	0.1045	0.1677	0.2050	-0.1308	-0.3281	-0.1446	-0.2160	0.1245	0.0950	-0.1377

In addition, the F-static has a value of 3.8917 and a p-value of 0.01, suggesting that the F-static is significant at 1 percent significance level. This suggests that the modeled regressors collectively have significant impact on total education spending in Malaysia. Also, the test for autocorrelation and heteroskedasticity for this model indicates that inferences based on this model are reliable. The Durbin Watson static has value 2.04, which is approximately 2. This, by the rule of thumb, suggests that there is no problem of autocorrelation in the model. Also, Breusch-Pagan Lagrange multiplier test for heteroskedasticity is applied to the model. The null hypothesis of this test is that the residuals have constant variance. This null hypothesis is accepted for our model, as the p-value of this test is 0.8418 which is greater than 5% and 10% percent conventional level of significance. The Table 3 below shows the result that is obtained from the OLS estimated model through Eviews software.

Table 3: Estimated Model.

Dependent Variable: D(Tedu) Sample (adjusted): 1991 2015 Included observations: 25 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	2848.613	12662.47	0.224965	0.8253
D(GDP)	-0.41774	0.337411	-1.23808	0.236
D(REV)	0.152284	0.054152	2.812145	0.0138
POV	76.95487	169.9328	0.452855	0.6576
UNEMP	-2170.84	1336.962	-1.62371	0.1267
POP_15	0.510238	1.560294	0.327014	0.7485
D(s/t ter)	64.29963	132.51	0.485244	0.635
D(s/t pri)	642.0795	1533.383	0.418734	0.6818
D(s/t Sec)	-3879.26	1507.588	-2.57316	0.0221
D(DEF)	-0.21972	0.0902	-2.43589	0.0288
EC	299.5179	1166.242	0.256823	0.8011
R-squared	0.735436	Mean dependent var		2008.84
Adjusted R-squared	0.546461	S.D. dependent var		2611.851
S.E. of regression	1758.958	Akaike info criterion		18.08301
Sum squared resid	43315058	Schwarz criterion		18.61932
Log likelihood	-215.038	Hannan-Quinn criter.		18.23176
F-statistic	3.891723	Durbin-Watson stat		2.043224
Prob(F-statistic)	0.010536	Heteroskedasticity test		0.8418
Serial correlation LM test	0.8622			

With the output from Table 3, the Equation two that we estimated can be rewritten as the Equation 3 below. The equation below can be accepted as a strong explanation of the determinants of government total education expenditure based on the statistical significance as shown in the F-statistics. The impact of the economic-demographic variables in determining the allocation of total public expenditure as follows. First, revenue is positive and significant demonstrating that the total government expenditure in Malaysia reacts in a positive way with the revenue collected. Second budget deficit has a negative and significant effect on growth of the total education expenditure. This proves that as the budget deficit reduces by one present then the growth of total government education expenditure increases by 0.22 percent. Both the argument was supported by Buchana (1975) and Hanushek and Rivkin, 1997 as discussed in the literature review above. Whereas, the other economic indicators such as poverty and GDP per capita is not significant in the result. This shows that the growth of GDP per capita and poverty rate is not taken under the determination of the total education expenditure. As for the unemployment rate, our model has an insignificant and negative coefficient. It is possible that policymakers do not take into account the issue of unemployment. The result shows is same for the research done at Thailand by Danuvas 2012.

$$DTedu = 2848.613 + 0.152284\ DRev ** -0.2197\ DDef ** -0.4177\ DGdp + 76.95\ Pov - 2170.84\ unemp + 0.510\ Pop15 + 642.07\ D\frac{s}{t}pri - 3879.26\ D\frac{s}{t}sec * * +64.299\ D\frac{s}{t}\ ter + 299.5179\ EC \quad (3)$$

The demographic variables have no significant impact on total education policy at all apart from the student teacher ratio in tertiary level of education. The only demographic variable in the above equation that seems to significantly determine the total educational expenditure is student teacher ratio, which has demonstrated a negative and significant relationship with the dependent variable. The results seem to send a signal that policymakers hardly take into account the demographic factors, particularly the demand from the educational sector as an important factor to determine the level of expenditure. In other words, the government may have overlooked these factors when making decisions on educational expenditure.

Population below 15 has a positive coefficient but does not have a significant impact. Population below 15 is the category of age where education is compulsory and should be given important to reduce the social negative impact to the society. Policymakers should analyze the education plan and programs for this category age population to produce a high quality human capital in future. Similar results have been found in Mauro (1998) where he included the share of the population aged between 5 and 20 in order to raise the magnitude of the coefficient on corruption. As indicated the model failed to find any particular relationship between age and government expenditure, probably because of the lack of data on social programmer for the elderly in the African countries included in the model.

The last political variable in the above equation represent the election cycle using it as a dummy variable. Even though it shows a positive coefficient, it indicates an insignificant impact on total educational expenditure. This could mean that the political business cycle theory is not applicable to the case of total educational expenditure policy in Malaysia. Although the result is against the theory by Alesina and Sachs (1988) and Hibbs (1994) in political business cycle but the result shows that Malaysian government did not change its allocation of total educational expenditure significantly during the election period.

VII. Conclusion and Recommendation

Given the result of the research has provided insightful information for the policy implications. There are some implications that should be noted here as the suggestion to the policymakers on how to improve the determination of the total education expenditure in order to respond the needs of the people. The role of policymakers, in terms of efficiency and effectiveness, can be boosted from the application of the following suggestion of policy implications.

One of the suggestion of implication is formation of special department team under the Ministry of Education as independent officers. The objective of this department should be to ensure fiscal retrenchment when needed that is according to the economic and social trend of Malaysia. This department should play a major role in finding the areas that still need more budget to improve the education system in Malaysia. At the national level, the right type of educational expenditure should be allocated and the transparency issue should also be taken into account by this new department.

Secondly. other than the economic indicators the policy makers should also give important to the social indicators such as poverty rate, number of students, number of schools, number of teachers, enrollment rate and student teacher ratio in all level of educations. All these variables should be taken in account to determine the total education expenditure in Malaysia to become welfare based country.

Moreover, the proposed suggestions relating to the education expenditure from residents and the citizens should be taken into account. This has been done in education development plans in Malaysia in 2013 and this should be continued with improved measures. This will lead to more satisfaction on the plan and the government spending to the citizens by the government. Future studies could be improved with a larger sample size study because this study had limitations of the data, which only included 25 observations. It is proposed also to carry on tests like Johansen co-integration test, Granger Causality Test and Vector Error Correction Model.

As the conclusion this study shows the significant determinants of the total government expenditure. The demographic variables doesn't have a significant coefficient with the dependent variable which has to be noted by the policy maker. The political criteria show that the public expenditure on education does not relate to the political cycle. Therefore. the allocation of the total public education expenditure is not based on political issues. Future research should attempt to correct some of the shortcomings of this study.

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